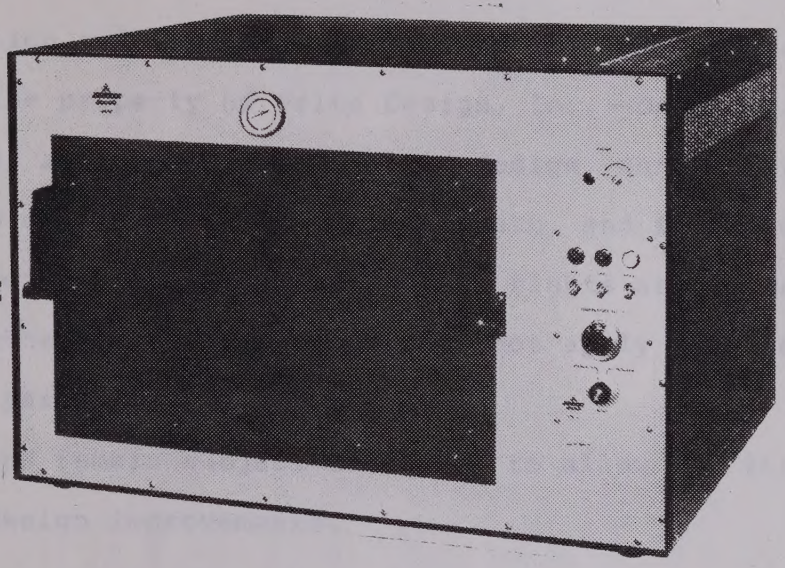
DELTA DESIGN
INC.

6400

INSTRUCTION MANUAL

DELTA DESIGN, INC.
5775 Kearny Villa Rd.
San Diego, California 92123
(619) 292-5000
TWX: (910) 335-1215

INSTRUCTION MANUAL
Model 6400



DELTA DESIGN INC.

ENVIRONMENTAL TEST CHAMBER

ENVIRONMENTAL CONTROL EQUIPMENT FOR RESEARCH AND INDUSTRY
5775 KEARNY VILLA ROAD • SAN DIEGO, CALIFORNIA 92123

6400-0976 Printed in U.S.A.

PROPRIETARY NOTICE

The information and design disclosed herein were originated by and are the property of Delta Design, Inc.—Delta Design, Inc. reserves all patent, proprietary design, manufacturing, reproduction use, and sales rights thereto, and to any article disclosed therein, except to the extent rights are expressly granted to others. The foregoing does not apply to vendor proprietary parts.

Specifications remain subject to change to allow the introduction of design improvements.

Copyright 1980©
Delta Design, Inc.
5775 Kearny Villa Rd.
San Diego, CA 92123

Printed in U.S.A.

SPECIFICATIONS

TEST VOLUME (H x W x D)	12" x 20" x 16" (30.48 x 50.80 x 40.64 Cm) 2.2 FT^3 (.062 M^3)
AIR CIRCULATION	Two 140 CFM Centrifugal Blowers With Baffling To Provide Equal Distribution Throughout The Chamber. The Air Flow Is In A Vertical Pattern.
OUTSIDE CASE DIMENSIONS	19-1/8" x 32-15/16" x 30" (48.56 x 83.66 x 76.20 Cm)
INNER LINER	Type 302 Stainless Steel
OUTER CASE	Aluminum
INSULATION	Fiberglas
WEIGHT	140 Lbs (63.50Kg)
POWER REQUIREMENTS	120 VAC, 50/60 Hz, Single Phase, 20 Amp, 2.4 kW or 208 VAC, 50/60 Hz, Single Phase, 20 Amp, 2.4 kW or 240 VAC, 50/60 Hz, Single Phase, 15 Amp, 2.4 kW.
CONTROLS	POWER On-Off Switch and Light COOL On-Off Switch and Light HEAT On-Off Switch and Light TEMPERATURE SET Control MANUAL/PROGRAM Control Switch (MODE)
HEATING ELEMENTS	Four 8.75 Ohm Elements, Nichrome Wire, Total of 1 kW for 120V and 1.6 kW for 240V. For 208V, Four 15 Ohm Elements, Nichrome Wire, Total of 3 kW.
COOLING	Liquid Carbon Dioxide (LCO_2) or Liquid Nitrogen (LN_2)
PROGRAMMING	Programmable
COOL DOWN TIME	Ambient to -54°C in 4½ minutes
HEAT UP TIME	Ambient to +217°C in 28 minutes
TEMPERATURE RANGE	-73°C to +315°C
RESETTABILITY	±0.25°C

SPECIFICATIONS (cont)

TEMPERATURE DEVIATION	±0.05°C
LINE VOLTAGE STABILIZATION	±0.15°C For 105 to 125 VAC Line Voltage Change ±0.15°C For 200 to 215 VAC Line Voltage Change ±0.15°C For 220 to 240 VAC Line Voltage Change
AMBIENT TEMPERATURE COMPENSATION	±0.010°C/°C
HEAT LOAD COMPENSATION	.020°C/Watt For Operation Above Ambient. .013°C/Watt For Operation Below Ambient.
GRADIENT IN TEST AREA (1-1/2" from walls in corners and in the center of the test area)	±0.75°C/100°C Difference Measured From Ambient
THERMAL IMPEDANCE OF CHAMBER	Approximately 0.40°C/Watt
NULL DETECTOR CONTACT CLOSURE	Temperature Will Be Within 2°C Of Final Temperature At 3 Minutes After Closure Occurs
NULL DETECTOR CONTACT RATING	1 Amp, 240 VAC, With Contact Protection Provided By User To Protect Against Inductive Loads

NOTE: IT IS RECOMMENDED THAT THIS MANUAL BE READ THOROUGHLY BEFORE CONNECTING EQUIPMENT TO ELECTRICAL POWER SOURCE.

INTRODUCTION

This Delta Design, Inc., Model 6400 Chamber is a precision environmental test chamber capable of attaining temperatures from -73°C to +315°C with a minimal temperature deviation of ±0.05°C.

Temperature control in this chamber is by means of Delta's Solid State Controller, which can be operated manually or thru an external programmer.

CONTENTS

		Page
SPECIFICATIONS		i
INTRODUCTION		iii
LIST OF ILLUSTRATIONS AND DRAWINGS		v
1	CHAMBER AND CONTROLLER DESCRIPTION	1
	1.1 Chamber	1
	1.2 Solid State Controller	1
	1.3 Null Detector Circuit	1
2	INITIAL SETUP	3
	2.1 Uncrating	3
	2.2 Electrical Connection	3
	2.3 Liquid Coolant	3
	2.4 Liquid Nitrogen	4
3	START UP PROCEDURE	5
	3.1 Precautions	5
	3.2 Controls	5
	3.3 Adjusting the Failsafe	5
4	SETTING THE DIAL TEMPERATURE INDICATOR	7
	4.1 Description	7
5	PROGRAMMING	8
	5.1 Description	8
6	WARRANTY	9

LIST OF ILLUSTRATIONS AND DRAWINGS

Figure/Drawing No.		Page
1	Temperature Set Dial	7
2	Operating Instructions	10
-	Trouble Shooting Chart	11
3	Air Flow Pattern	12
4	Component Identification	13
5	Component Removal	14
6	CO_2 Valve Assembly	15
7	LN_2 Valve Assembly	16
8	Temperature Control System	17
D1643470	Schematic Diagram - 120V CO_2 w/LN_2 and Dual Option	
D1636427	Schematic Diagram - 208V w/CO_2 & LN_2 Option	
D1643471	Schematic Diagram - 240V w/CO_2 & LN_2 Option	
P/L 2636342	Chamber Assembly 6400	

1 CHAMBER AND CONTROLLER DESCRIPTION

1.1 Chamber

1.1.1 The Model 6400 is a precision environmental temperature chamber having a stainless steel interior, aluminum outer case and fiberglas insulation. The air circulation is closed and provided by 140 CFM blowers. The chamber is heated by applying full wave power to bobbin wound nichrome heating elements via the heat switch.

1.1.2 The chamber is cooled by injecting liquid CO_2 (liquid nitrogen in the LN_2 models) into the air stream through an expansion nozzle. The coolant flow is metered by a solenoid valve, controlled by the cool solid state switch.

1.1.3 The temperature control system is shown in block diagram form as Figure 8.

1.2 Solid State Controller

1.2.1 The controller compares the resistance of the temperature probe to the resistance of the indicated set point on the TEMPERATURE SET dial potentiometer or the digital resistance selection of the optional DIGITEMP controller. The resistance of a remote programming resistor is compared to the probe resistance of the MODE switch in the PROGRAM position.

1.2.2 The resistance of the probe will be either less than, equal to, or greater than the resistance of the TEMPERATURE SET potentiometer (or the DIGITEMP), i.e., program resistance. These three situations directly correspond to the chamber temperature being lower than, equal to, or higher than desired. The controller applies heat, coolant, or withholds both to obtain and maintain the selected temperature in the chamber.

1.2.3 NOTICE: The controller is a three mode unit, i.e.:

(a) Heat only
(b) No heat or coolant
(c) Coolant only

This mode of control ensures that LCO_2 or LN_2 is not wasted in a continuous cycling of the heaters and coolant valve such as would be the case for a simple two mode output controller.

1.2.4 Further information on the controller may be found in the complete Type III Controller Manual included as part of this information package.

1.3 Null Detector Circuit

1.3.1 A contact closure is provided at the rear which functions when the chamber reaches the indicated set point of the controller.

This contact closure may be used to signal external equipment that the chamber has reached selected temperature.

1.3.2 The Delta Design Model 9308 HI-LO Step Programmer, Model 9311 TEN STEP Programmer, and the Model 9313 HI-LO AMBIENT Programmer utilize the null contacts to start their timers when they are used with the chamber. This contact closure feature is most useful in automatic test programming applications.

2 INITIAL SETUP

2.1 Uncrating - Remove all shipping tie downs and protective packaging.

2.2 Electrical Connection - Depending on the chamber purchased, one of the following is applicable. Power connection should be an AC power source rated at 120 VAC, 50/60 Hz, single phase, 20 Amp or 208 VAC, 50/60 Hz, single phase, 20 Amp or 240 VAC, 50/60 Hz, single phase, 15 Amps. THE CHAMBER MUST BE CONNECTED TO EARTH GROUND.

2.2.1 Delta chambers that operate on 240 VAC split the incoming phases for the coolant valve solenoid, failsafe relay, blowers and for the controller. The heater circuit operates on 240 VAC.

2.3 Liquid Coolant - Liquid Carbon Dioxide (LCO_2) - 1050 psi system (standard). Optional systems are LCO_2 - 300 psi, and Liquid Nitrogen (LN_2) - 100 psi.

2.3.1 Liquid Carbon Dioxide - 1050 psi system. A siphon type liquid CO_2 bottle is recommended.

2.3.1.1 Test the bottle by releasing a small amount of LCO_2 into a white handkerchief. Any brown stain indicates rust which would clog the filter and valve in the chamber. A wet handkerchief indicates the presence of water which would either freeze in the valve or clog the injector nozzle. Crack the LCO_2 valve on the cylinder open and notice the spray. It should be a dense, white cloud. It will look thin and grey when the tank is almost empty. An almost empty tank will not give proper cooling and should not be used. Connect the tank of LCO_2 to the rear of the chamber with the high-pressure hose and fittings which are supplied. Place a small amount of sealing compound on the threads of the male fitting to prevent leakage. DO NOT LET ANY SEALING COMPOUND GET INTO THE VALVE INLET ON THE REAR OF THE CHAMBER. Open the bottle and check for leaks which show as frosty spots on the hose and fittings.

2.3.2 Liquid Carbon Dioxide - 300 psi Low Pressure system.

2.3.2.1 When the in-plant use of liquid CO_2 exceeds approximately 1000 to 2000 pounds per month, a bulk liquid storage system may be installed to reduce the cost of coolant. Chambers being operated with this type of system have to be fitted with a different CO_2 valve and injector than used on a 1050 psi system. Contact Delta for information concerning valve replacement. If new chambers are ordered for use with a bulk storage 300 psi system, the fact should be stated on the order.

NOTE: The bulk storage system should be of the recirculating type, if possible. If not, the supply should be located as close as possible to the chamber to minimize gas formation in the supply line. This is

particularly important in low volume usage systems as the insulation and fluid flow are the factors that prevent boiling of CO_2 in the supply line. Gaseous CO_2 is not an effective coolant.

2.3.2.2 All lines, valves and connecting hoses should be blown out before the chamber is connected. Water is very troublesome and is apparently inherent in some low-pressure refrigerated supplies. If lines are opened to bleed off excessive pressure at shutdown, close them to prevent contamination by condensed moisture. This will help keep ice from forming in the control valve.

2.4 Liquid Nitrogen

WARNING

Oxygen in the air surrounding the chamber inner liner and in the insulation can be liquified at low temperatures. This creates an oxygen-rich atmosphere surrounding the heater area. The chamber tends to be self-purging as the nitrogen replaces the usual atmosphere near the heaters. Any mixture of oil and liquid oxygen can be explosive; therefore, extreme care must be used during operation at very low temperatures.

2.4.1 A 100 psi valve and stainless steel injector assembly is used for the liquid nitrogen applications. LCO_2 from a tank will not operate properly in a chamber equipped for LN_2.

2.4.2 Connect a liquid nitrogen withdrawal container to the LN_2 input of the chamber with an insulated transfer line. A relief valve should be installed in the line with a relief pressure between 60 and 100 psi for a 2700 cubic foot 50 psi liquid withdrawal container.

3 STARTING UP PROCEDURE

3.1 Precautions

3.1.1 Connect SAFETY PLUG (rear of chamber) when external programmer is not being used. This will preclude any accidental high temperature being obtained if the MODE switch is placed in the PROGRAM position with no programmer connected.

3.1.2 Unplug the chamber from all sources of power before attempting any type of servicing or removal of the controller chassis. The case of the triac switch assembly, located on the controller subassembly, is at power line potential and extreme care in servicing or calibration must be exercised.

3.1.3 Do not block the sides of chamber or outlet of controller area for cooling purposes.

3.1.4 Ensure that the correct type of LCO_2 (liquid carbon dioxide) source is connected to the chamber before operating at low temperature. Recommend standard 50 pound capacity high dry siphon LCO_2 supply. Test the LCO_2 for cleanliness by discharging a quantity of it through a clean white handkerchief. Bits of rust and traces of oil, ice or water indicate contaminated LCO_2 which should not be used.

3.1.5 Operate the chamber at a temperature of 200°C for an hour after prolonged operation at low temperatures. This restores the efficiency of the insulating material by driving out the moisture which has been condensed out of the air.

WARNING

Liquid oxygen may be formed in the insulation when the chamber is operated at low temperatures. Any mixture of oil and liquid oxygen can be explosive. If oil contamination is suspected, bake the chamber out by operating it at a temperature of 200°C for a period of three hours before taking it to extremely low temperatures.

3.1.6 Do not leave liquid nitrogen trapped in a line (valves closed at both ends) as high pressures will be developed as the liquid absorbs heat and becomes gas.

3.2 Controls - See Figure 2.

3.3 Adjusting the Failsafe

3.3.1 To adjust the FAILSAFE high temperature protection unit, rotate the slotted FAILSAFE control. The trip temperature is increased by rotating the control counterclockwise, and is lowered by turning the control clockwise. The FAILSAFE setting is preset at the factory at +315°C (maximum rating of standard chamber). If it is desirable to change the setting to a lower temperature setting, operate the chamber at the maximum temperature desired. Adjust the FAILSAFE until it is on the verge of tripping.

CAUTION

Do not rotate the FAILSAFE setting more than one full turn lower than the trip point, as this can damage the unit.

4 SETTING THE DIAL TEMPERATURE INDICATOR

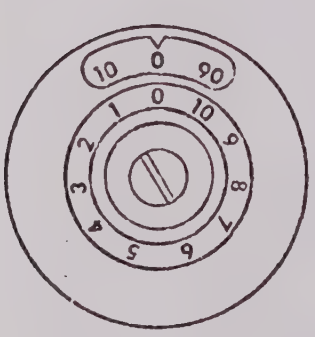
4.1 Description

4.1.1 Refer to example A - Set both dials at zero.

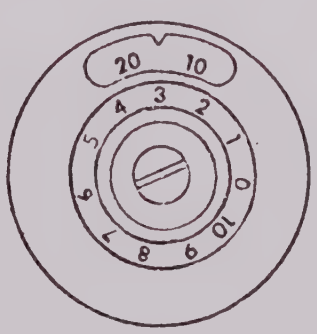
4.1.2 One complete rotation of the knob equals 100°. Clockwise is plus (+) degrees (F or C) and counterclockwise is minus (-) degrees. Each rotation of the knob is indicated by the small dial nearest the knob.

4.1.3 The large dial indicates each degree, every tenth numbered. Thus, as in example B, the large dial is set at 15, and the small dial is beyond 3; therefore, the setting is +315°.

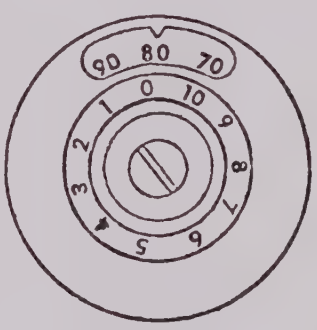
4.1.4 When setting to a minus (-) temperature, it is necessary to subtract the degrees from 100; i.e., 20 from 100 equals "80" reading on the large dial to have a setting of -20°. This is shown in example C. It will be noted that the zero on the small dial is just to the left of the marker. Also, on the models having a range greater than -100°, it is necessary to keep track of the counterclockwise rotation of the knob.



A
(0°)



B
(+315°)



C
(-20°)

FIGURE 1
Temperature Set Dial

5 PROGRAMMING

5.1 Description

5.1.1 Connect the correct resistances between pins 1 and 3 of the PROGRAM Jack. Set the MODE switch to PROGRAM and the HEAT and COOL switches to their ON positions. The controller will apply heat or coolant as needed to obtain the programmed temperature.

5.1.2 A Safety plug is provided with the chamber and should be kept connected to the PROGRAM input whenever an actual programmer or actual resistance is not connected. The safety plug will prevent the chamber from accidently being programmed to a very high temperature if the MODE siwtch is placed in the PROGRAM position with an open PROGRAM input.

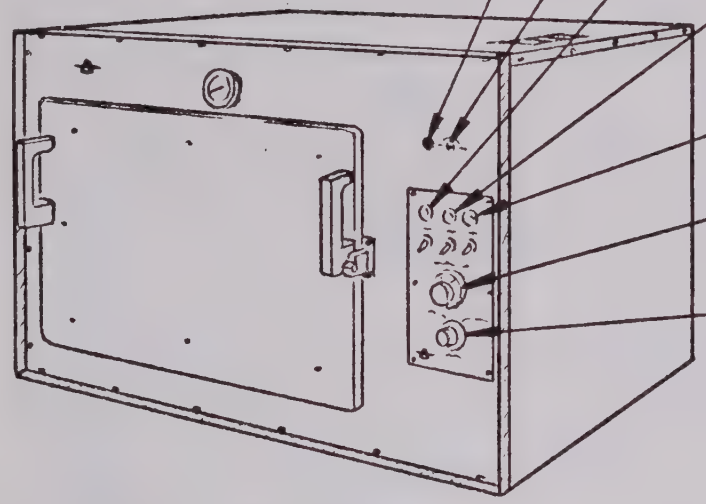
5.1.3 The safety plug disables the heat and cool circuits of the controller when the MODE siwtch is placed in the PROGRAM position.

6 WARRANTY

Delta Design, Inc. guarantees all products manufactured and sold by it to conform to published specifications and against defective material and workmanship for a period of 90 days from the date of our shipment. Temperature chambers and electronics are warranted for one year from date of shipment. All contactor assemblies are warranted for a period of 90 days or 1/2 million cycles. Obligation under these warranties is limited to repair or replacement by Delta at its plant or one of its authorized service stations, on any of our products which Delta determines to be defective or not in accord with stated specifications. Delta will not accept responsibility for any defect caused by improper use, nor will Delta assume liability for any unauthorized repairs or modifications to its products or materials, even though defective or not in accord with the specifications. In no case will responsibility extend to products, materials, or equipment not manufactured by Delta. All products to be returned to Delta's plant for warranty repair must have prior written approval from Delta Design, Inc., and all return transportation charges will be at the buyer's expense. Delta will not accept liability for any unauthorized returns. No liability will be accepted for any damages to customer's materials, and equipment due to the use or misuse of Delta's products, nor for any loss of profits or other special damages. Delat Design, Inc., reserves the right to change price, design features and/or specifications without notice.

FAILSAFE ADJUST- LOCATED ON FRONT OF CHAMBER
TURN TO CHANGE TEMPERATURE AT WHICH FAILSAFE WILL TRIP
CAUTION: DO NOT LOWER FAILSAFE TEMP. SETTING UNLESS HEAT SW. IS ON & FAILSAFE IS OFF.

FAILSAFE LAMP- GLOWS RED WHEN FAILSAFE IS TRIPPED



THERMOMETER- INDICATES CHAMBER TEMP. IN TEST VOLUME.

OPERATING INSTRUCTIONS:

A. INSTALL THE CHAMBER, CONNECT POWER CORD TO SUITABLE OUTLET & COOLANT SUPPLY TO VALVE INLET.

B. FOLLOW STEPS 1 THRU 5.

(5) HEAT SWITCH & LIGHT-- SWITCH ON-- ON POSITION ALLOWS CONTROLLER TO APPLY HEAT AUTOMATICALLY TO MAINTAIN SELECTED TEMPERATURE IN CHAMBER RED LIGHT IS ON STEADY WHEN CHAMBER IS HEATING, BLINKS WHEN CHAMBER REACHES SELECTED TEMPERATURE ABOVE AMBIENT

(4) COOL SWITCH & LIGHT-- SWITCH ON-- ON POSITION ALLOWS CONTROLLER TO APPLY COOLANT AUTOMATICALLY TO MAINTAIN SELECTED TEMPERATURE IN CHAMBER GREEN LIGHT IS ON STEADY WHEN CHAMBER IS COOLING.

(3) POWER SWITCH & LIGHT-- SWITCH ON MAIN POWER ON. WHITE LIGHT GLOWS WHEN POWER IS ON.

(2) TEMPERATURE SET DIAL-- SET TO DESIRED TEMPERATURE. SELECTS CHAMBER TEMPERATURE IF MODE SWITCH IS IN MANUAL POSITION.

(1) MODE SWITCH-- SET TO MANUAL POSITION. ASSIGNS THE SELECTION OF CHAMBER TEMPERATURE TO TEMPERATURE SET DIAL OR EXTERNAL PROGRAMMER.

MANUAL POSITION: TEMPERATURE SET DIAL DETERMINES CHAMBER TEMPERATURE.

PROGRAM POSITION: PROGRAMMING RESISTANCE CONNECTED TO PROGRAM JACK AT REAR OF UNIT SELECTS CHAMBER TEMPERATURE

CAUTION: ALWAYS CONNECT SAFETY PLUG (AT REAR OF CHAMBER) WHEN AN EXTERNAL PROGRAMMER IS NOT BEING USED

FIGURE 2
OPERATING INSTRUCTIONS

TROUBLE SHOOTING: ELECTRICAL

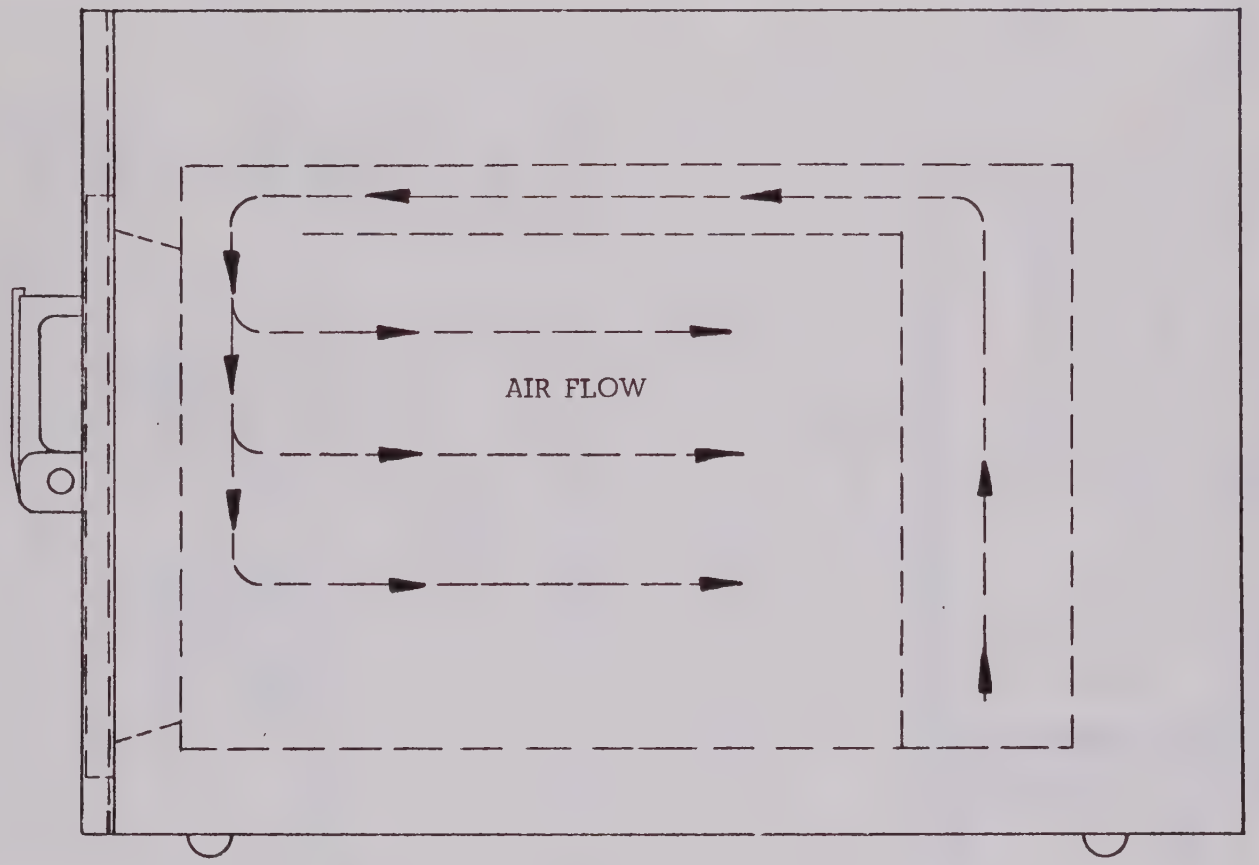
HOW TO USE THIS CHART

1. Turn Mode Switch to Manual.
2. Note Thermometer Reading (Chamber Temperature)
3. Turn Heat and Cool Switches On.
4. Turn Temperature Set Control 50° Higher than Chamber Temperature and note the conditions of the Heat and Cool Lamps.
5. Turn Temperature Set Control 50° Lower than Chamber Temperature and note the conditions of the Heat and Cool Lamps.

These two situations determine the correct block to read in the chart:

6. Enter the Chart at the Top for the conditions observed in step 4. (50° Higher than Chamber Temperature.)
7. Enter the Chart at the Left Side for the conditions observed in step 5. (50° Lower than Chamber Temperature.)

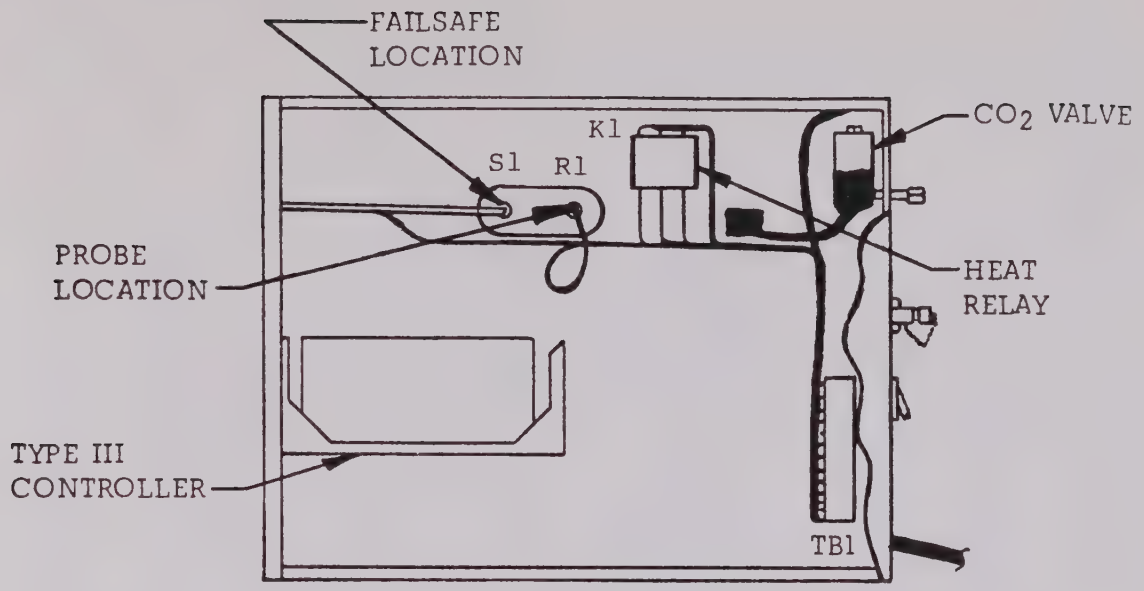
		LIGHT STATE WITH TEMPERATURE SET DIAL 50° HIGHER THAN CHAMBER TEMP.			
LIGHT STATE WITH TEMPERATURE SET DIAL 50° LOWER THAN CHAMBER TEMP.		RED - OFF GREEN - OFF	RED - ON GREEN - OFF	RED - OFF GREEN - ON	RED - ON GREEN - ON
	RED - OFF GREEN - OFF	Probe Element shorted to case. (Replace) Failure on Amplifier P.C. Board. (Trace signal with scope) Transformer Winding open.	Cool Circuit has failed. Trace signals with scope.		
	RED - ON GREEN - OFF		Probe shorted out. Temp. set Pot. — open. Cool Anticipator winding open. Check between Terminal A and Case of Q8 for 10Ω.		
	RED - OFF GREEN - ON	Failsafe Relay K1 not energizing. Coil resistance will be Approx. 10K. Failsafe open. Heat Triac failed.	**NORMAL**	Probe Open. Temp. Set. Pot. shorted. Heat Anticipator Winding open: Check between B and Case of Q9 for 10Ω.	Cool Circuit has failed — Trace signal with scope.
	RED - ON GREEN - ON		Heat circuit has failed — Trace signal with scope. Triac failed.		



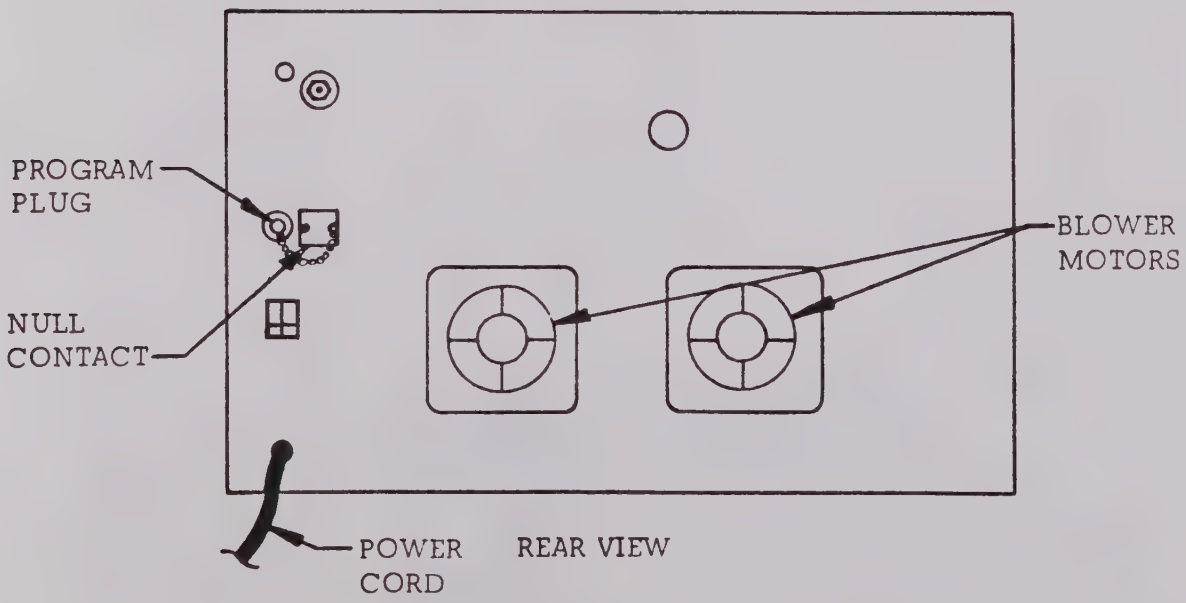
SIDE VIEW

FIGURE 3

CHAMBER AIR FLOW PATTERN



SIDE VIEW



REAR VIEW

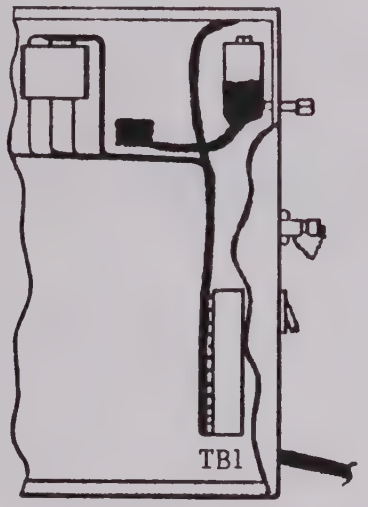
FIGURE 4
COMPONENT IDENTIFICATION

TO REMOVE BLOWER MOTORS

1. Unplug chamber power cord.
2. Do not remove rear panel.
3. Remove 4 screws and lay grill aside.
4. Remove wire nuts connecting motor to chamber power.
5. Remove two screws that mount motor to chamber.
6. Pull motor straight back to remove.

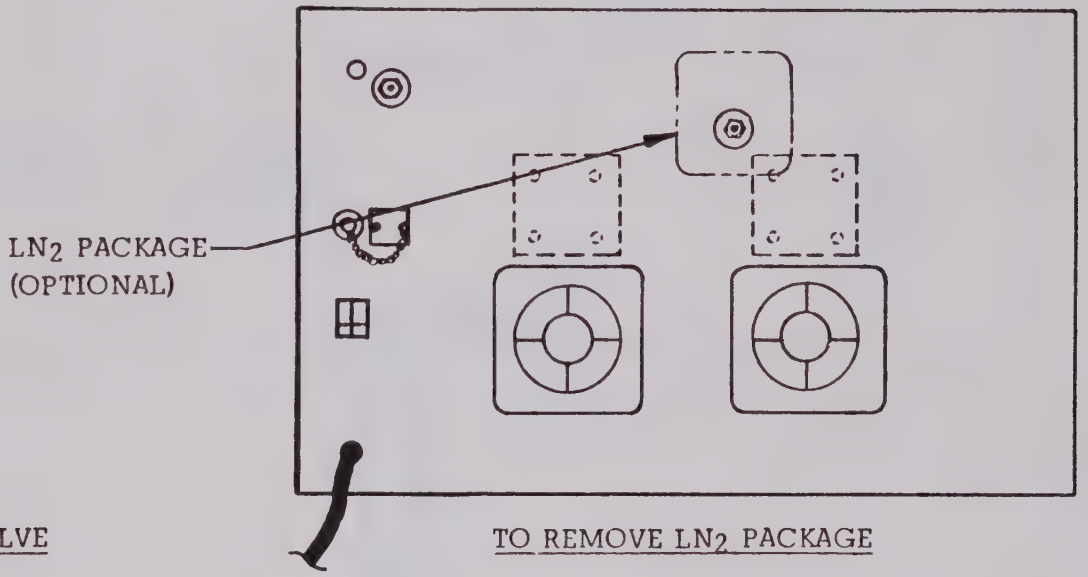
TO REMOVE HEATER

1. Unplug chamber power cord.
2. Remove and lay rear panel horizontally behind chamber.
3. Unpack fiberglas to expose heaters.
4. Remove wires from each heater unit.
5. Remove mounting screws.
6. Pull out heater assembly.



TO REMOVE CO_2 VALVE

1. Unplug chamber power cord.
2. Remove screws from right side cover.
3. Place right side cover on top of chamber.
4. Unscrew wire nuts.
5. Remove screws and take out CO_2 valve.



TO REMOVE LN_2 PACKAGE

1. Unplug chamber power cord.
2. Remove screws holding cover on valve assembly.
3. Remove screws holding valve to standoffs.
4. Remove nut joining inlet tubing to valve.
5. Pull valve away from chamber rear panel and remove wire nuts.

FIGURE 5
COMPONENT REMOVAL

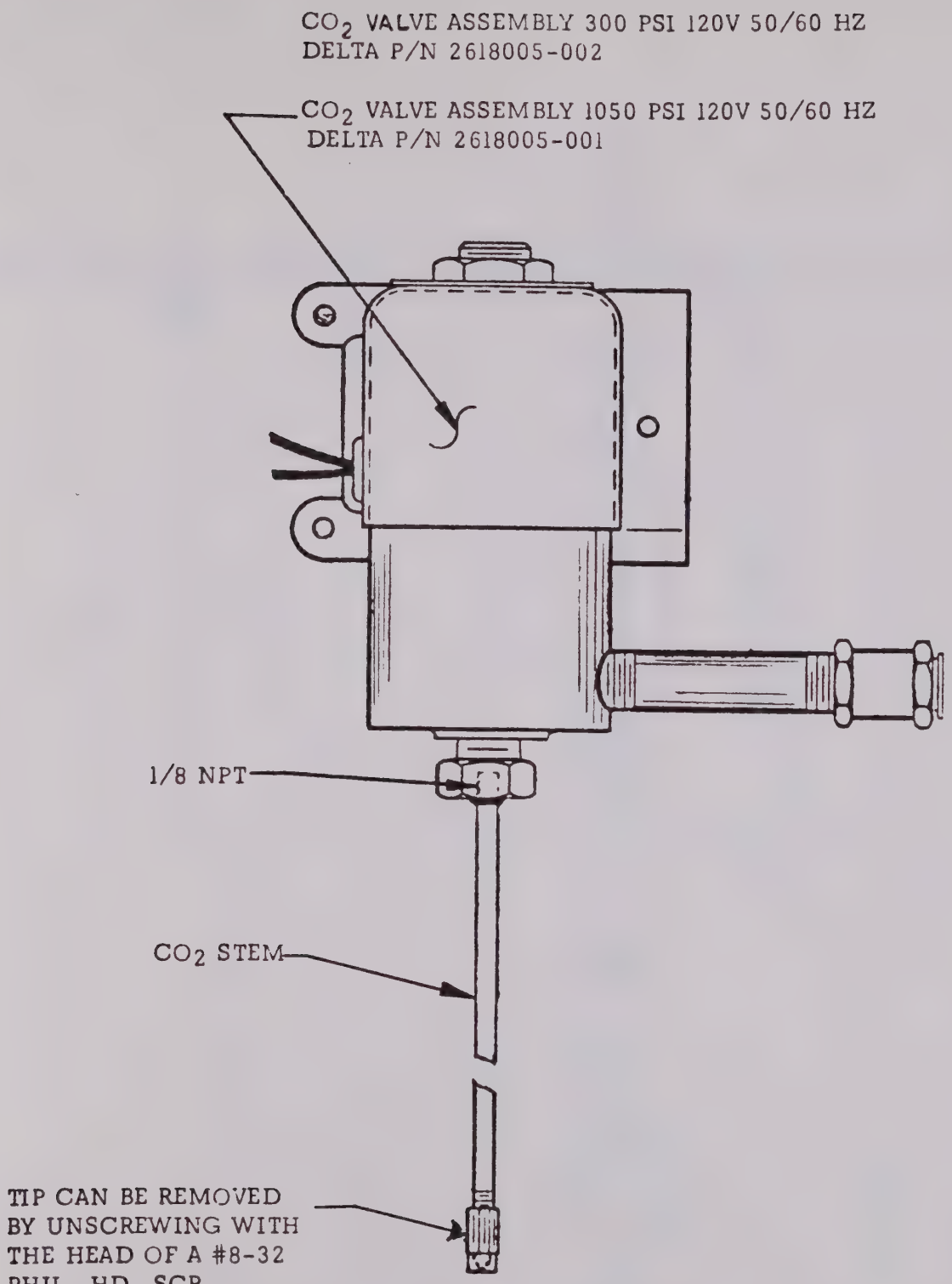

CO_2 VALVE ASSEMBLY 300 PSI 120V 50/60 HZ
DELTA P/N 2618005-002
CO_2 VALVE ASSEMBLY 1050 PSI 120V 50/60 HZ
DELTA P/N 2618005-001
1/8 NPT
CO_2 STEM
TIP CAN BE REMOVED
BY UNSCREWING WITH
THE HEAD OF A #8-32
PHIL. HD. SCR.

FIGURE 6

CO_2 Valve Assembly

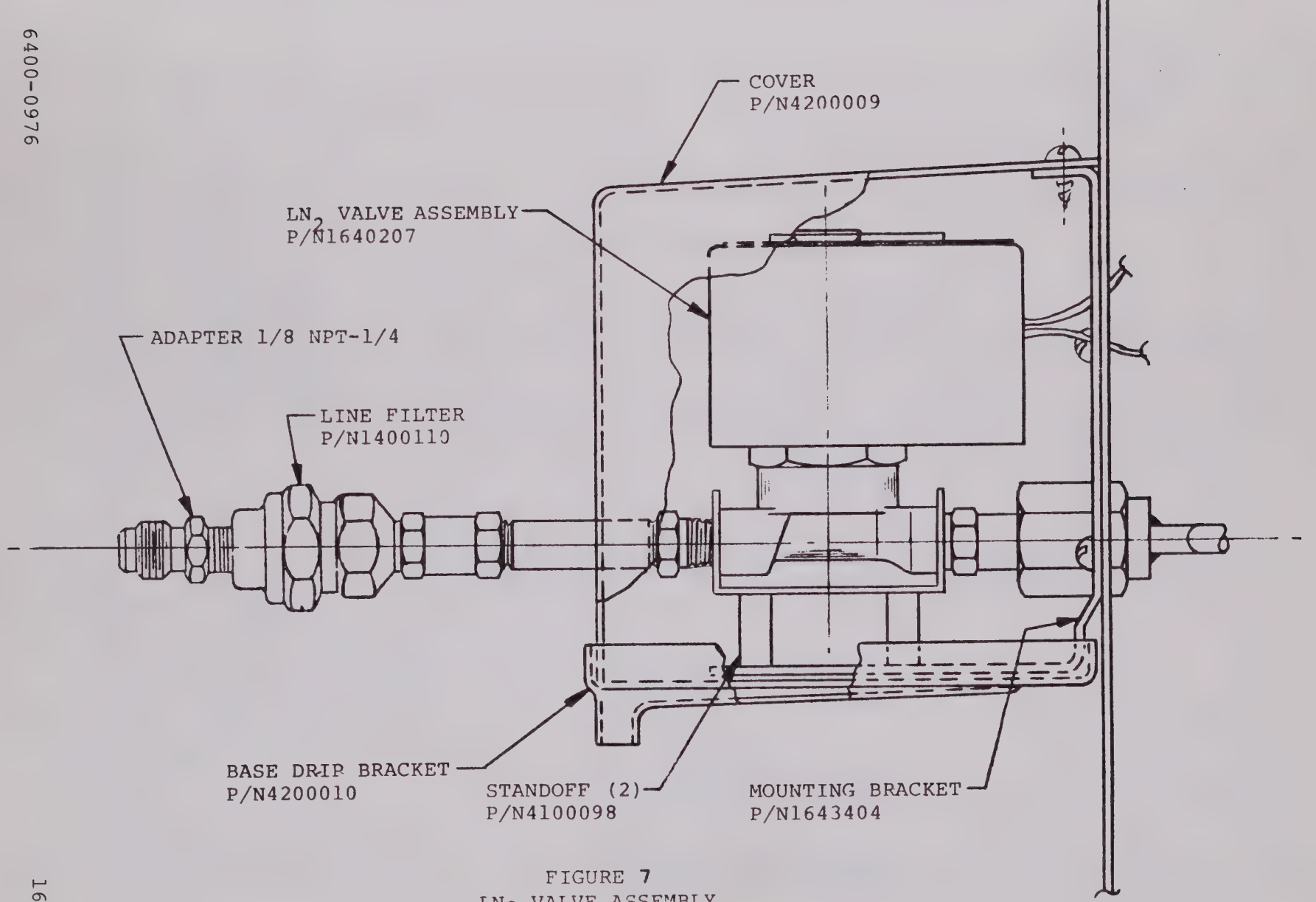


FIGURE 7
LN_2 VALVE ASSEMBLY

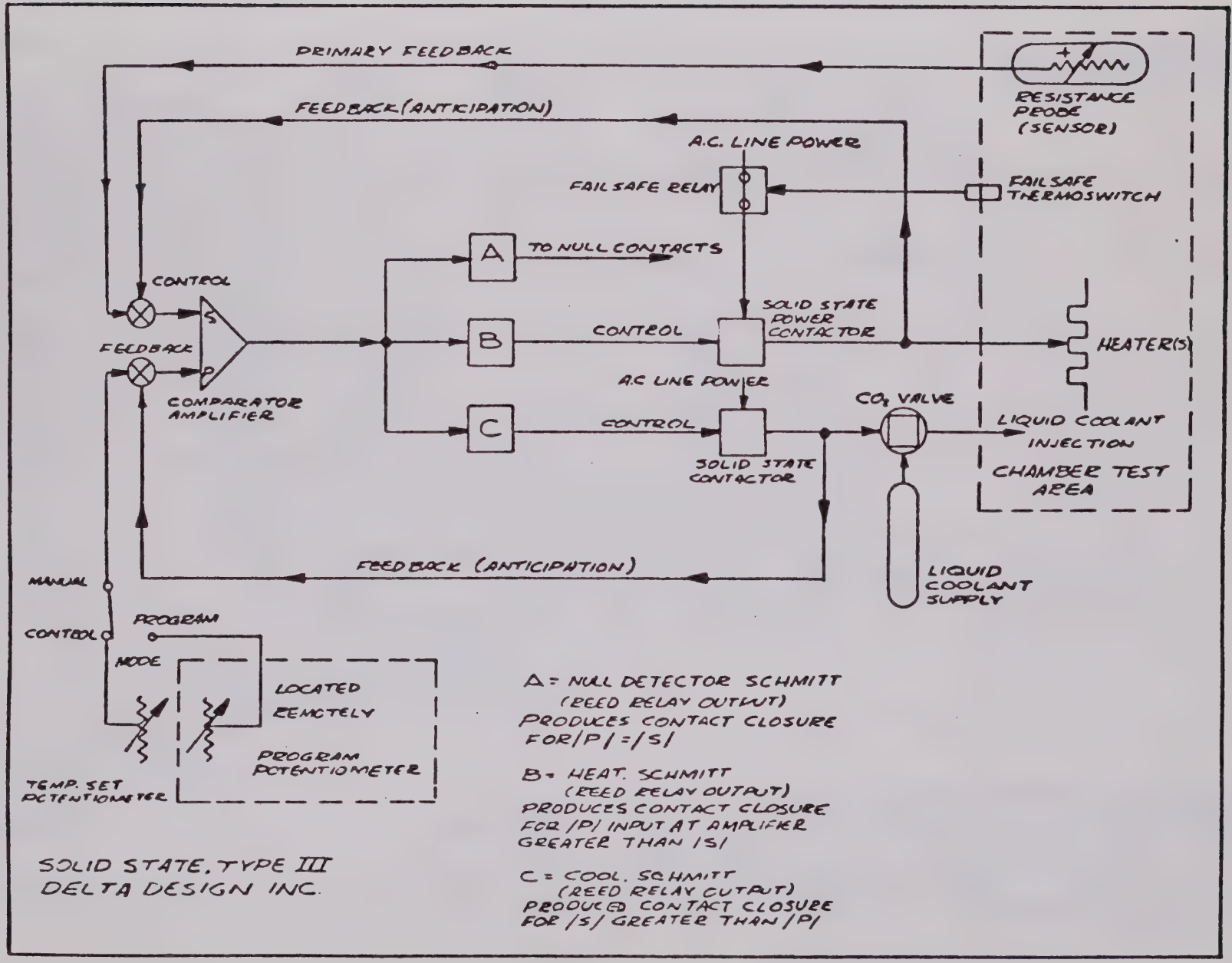
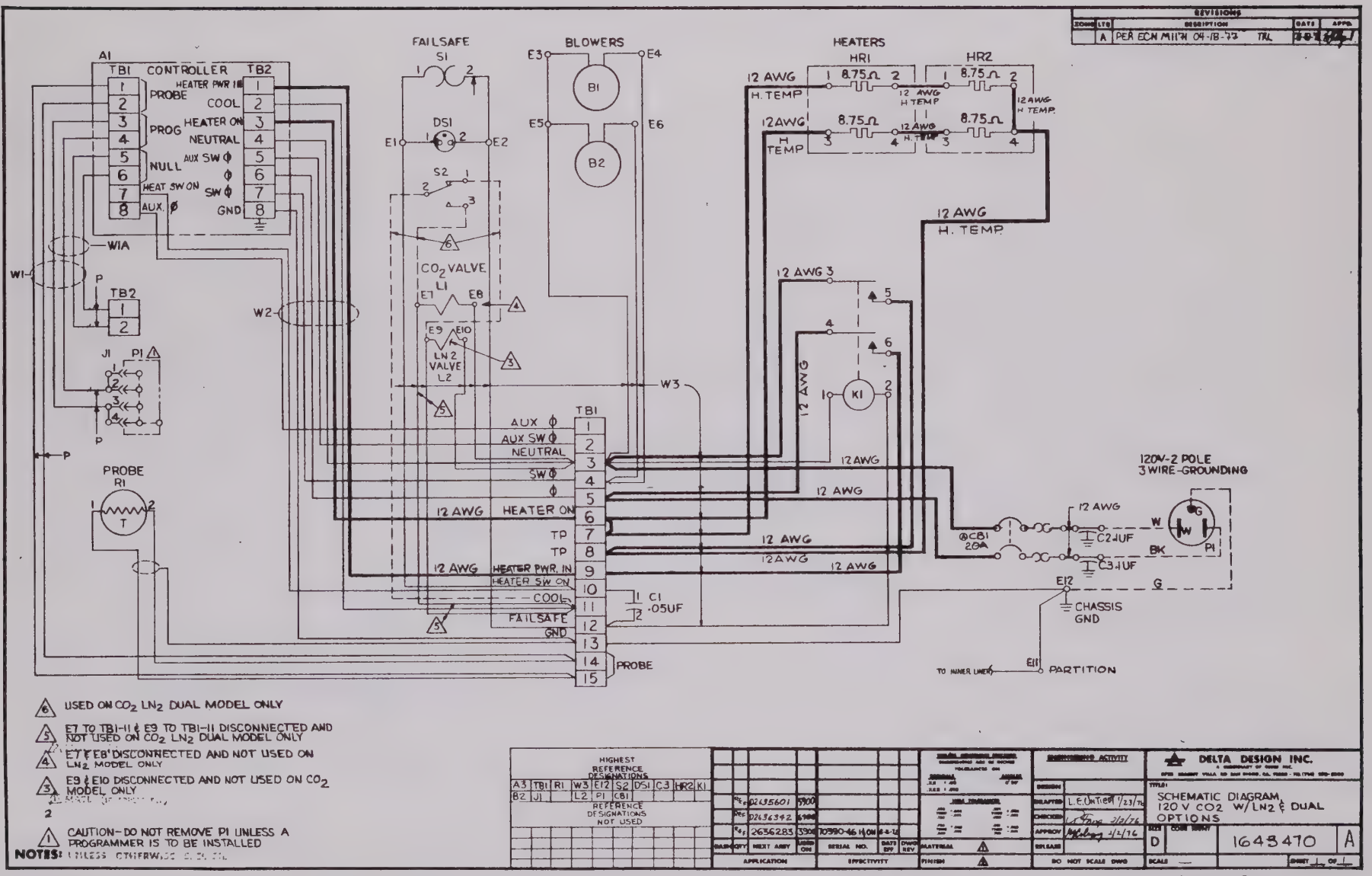


FIGURE 8

Temperature Control System



6 USED ON CO_2 LN_2 DUAL MODEL ONLY

5 E7 TO TB1-11 & E9 TO TB1-11 DISCONNECTED AND NOT USED ON CO_2 LN_2 DUAL MODEL ONLY

4 E7 & E8 DISCONNECTED AND NOT USED ON LN_2 MODEL ONLY

3 E9 & E10 DISCONNECTED AND NOT USED ON CO_2 MODEL ONLY

1 CAUTION-DO NOT REMOVE P1 UNLESS A PROGRAMMER IS TO BE INSTALLED

NOTES: UNLESS OTHERWISE SPECIFIED

HIGHEST REFERENCE DESIGNATIONS
A3 TB1 R1 W3 E12 S2 DS1 C3 HR2 K1
B2 J1 L2 P1 CB1
REFERENCE DESIGNATIONS NOT USED

02135601	5900				
02136392	6900				
2636283	3300	70390-46 H.ON	8-2-76		

DESIGN
DRAFTED L.E. UNTIER 1/23/76
CHECKED 2/2/76
APPROV 2/2/76
RELEASE

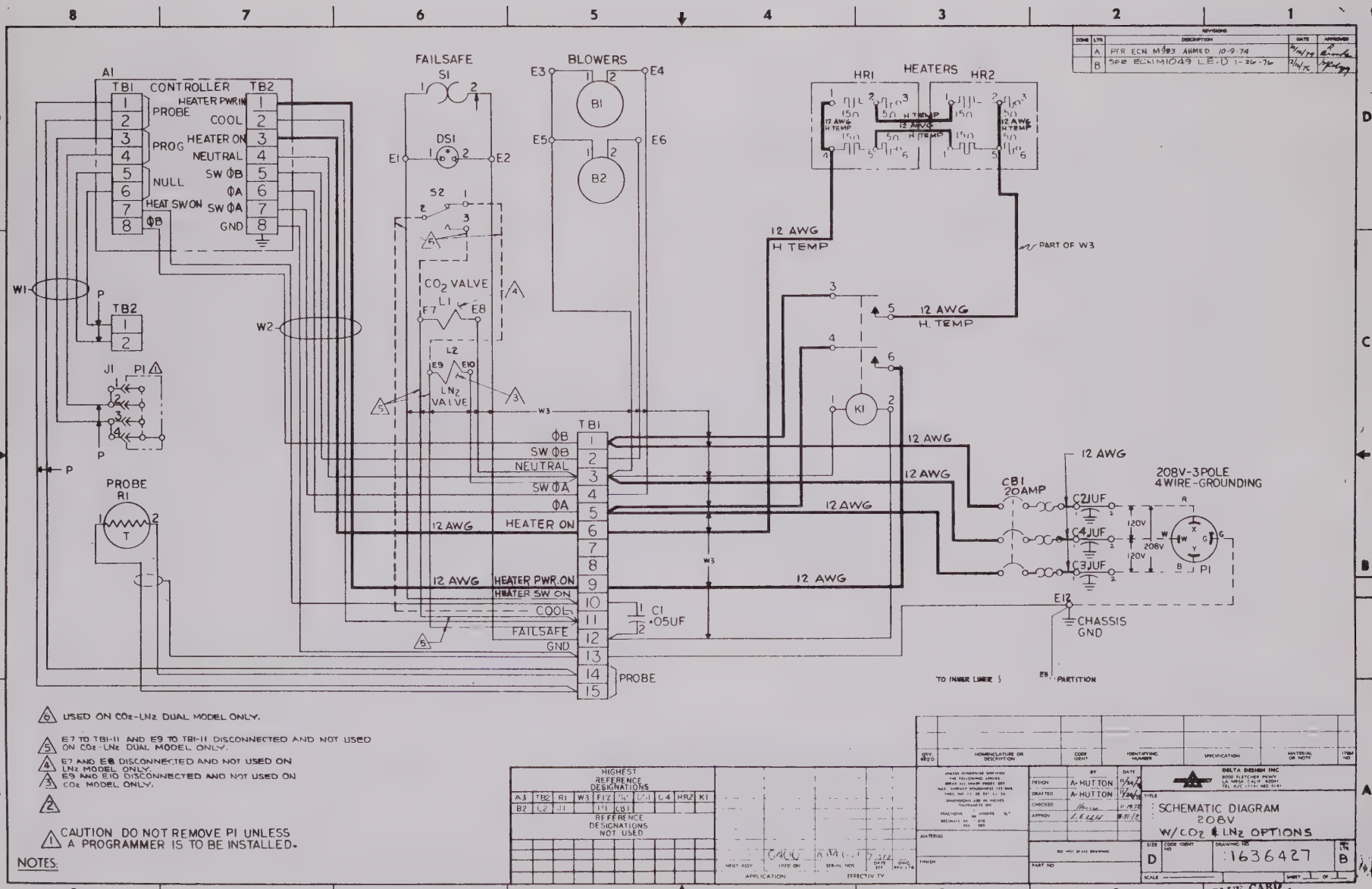
DELTA DESIGN INC.

TITLE: SCHEMATIC DIAGRAM 120 V CO2 W/LN2 & DUAL OPTIONS

SIZE D | CODE IDENT | 1645470 | A

SCALE — | SHEET 1 OF 1

BLUE CARD



6 USED ON CO2-LN2 DUAL MODEL ONLY.

5 E7 TO TB1-11 AND E9 TO TB1-11 DISCONNECTED AND NOT USED ON CO2-LN2 DUAL MODEL ONLY.

4 E7 AND E8 DISCONNECTED AND NOT USED ON LN2 MODEL ONLY. E9 AND E10 DISCONNECTED AND NOT USED ON CO2 MODEL ONLY.

3

2

1 CAUTION DO NOT REMOVE P1 UNLESS A PROGRAMMER IS TO BE INSTALLED.

NOTES:

ZONE	LTR	REVISIONS DESCRIPTION	DATE	APPROVED
	A	PER ECN M393 AHMED 10-9-74	10/9/74	
	B	PER ECN M1049 L.E-D 1-26-76	2/4/76	

HIGHEST REFERENCE DESIGNATIONS

A3	TB2	R1	W3	F1	F2	C-1	C4	HR2	K1			
B2	L2	J1		T1	CB1							

REFERENCE DESIGNATIONS NOT USED

	BY	DATE
DESIGN	A. HUTTON	11/24/72
DRAFTED	A. HUTTON	11/24/72
CHECKED		
APPROV	L.E.ELLIN	11-27-72

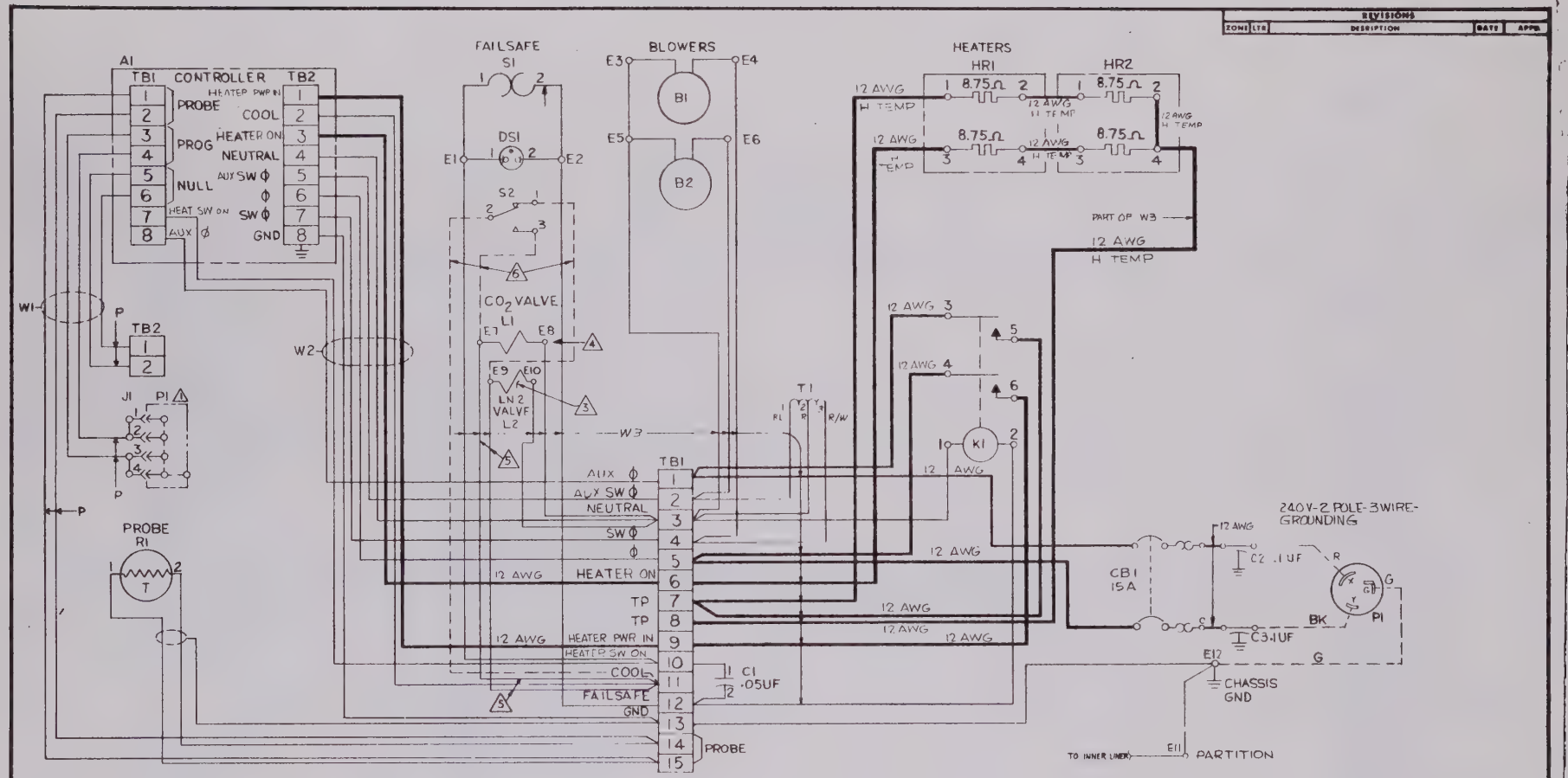
DELTA DESIGN INC
8000 FLETCHER PKWY
LA MESA (LA) 92041
TEL A/C (714) 465 9141

TITLE: SCHEMATIC DIAGRAM 208V W/CO2 & LN2 OPTIONS

SIZE	CODE IDENT NO	DRAWING NO	REV LTR
D		1636427	B

SCALE — SHEET 1 OF 1

BLUE CARD



6 USED ON CO_2 LN_2 DUAL MODEL ONLY

5 E7 TO TB1-11 & E9 TO TB1-11 DISCONNECTED AND NOT USED ON CO_2 LN_2 DUAL MODEL ONLY

4 E7 & E8 DISCONNECTED AND NOT USED ON LN_2 MODEL ONLY

3 E9 & E10 DISCONNECTED AND NOT USED ON CO_2 MODEL ONLY

2

1 CAUTION-DO NOT REMOVE P1 UNLESS A PROGRAMMER IS TO BE INSTALLED

NOTES:

ZONE	LTR	REVISIONS DESCRIPTION	DATE	APPD

HIGHEST REFERENCE DESIGNATIONS: A3 | TB1 | R1 | W3 | F12 | S2 | DS1 | C3 | HR2 | K1 / B2 | J1 | | L2 | T1 | T81 |

REFERENCE DESIGNATIONS NOT USED

BASIC QTY	PART NUMBER	USED ON
	02436392	6470
	02436401	6900
	02436283	3900

APPLICATION | SERIAL NO. | DATE EFF | DWG REV | EFFECTIVITY | MATERIAL | FINISH | DO NOT SCALE DWG

ENGINEERING ACTIVITY: ECN M1052

DESIGN		
DRAFTED	L. UNTICUT	1/23/76
CHECKED		2/2/76
APPROV		2/2/76
RELEASE		

SCALE —

DELTA DESIGN INC.
A SUBSIDIARY OF CONN INC.
SAN DIEGO, CA.

TITLE: SCHEMATIC DIAGRAM 240V W/LN2 & DUAL OPTIONS

SIZE D | CODE IDENT | 1643471 | SHEET 1 OF 1

FORM 4-17-72

DELTA DESIGN, INC.
5725 KEARNY VILLA RD
SAN DIEGO, CA. 92123
TEL. (714) 292-5000

NOTES: 1. SH 1, 2, 3 & 4 ARE "D" SIZE. ⑤ TO BE SHIPPED WITH CHAMBER
④ THESE DWGS ARE FOR OPTIONAL EQUIP. ONLY AND ARE NOT PART OF BASIC CHAMBER ASSY
③ USE ONLY AS REQ'D TO OPTIMIZE SEAL ④ 300 PSI USE 2618017-003

ITEM	QTY	DRAWING NUMBER		DESCRIPTION	MANUFACT AND [illegible]	[illegible] OR PART NO.	FAB CODE
00		D2636342		CHAMBER ASSEMBLY		2636342	16
00	REF	D1636427	②	SCHEMATIC DIAGRAM 208V			80
00	REF	D1643471		SCHEMATIC DIAGRAM 240V			80
00	REF	D1643470		SCHEMATIC DIAGRAM 120 V			80
00	REF	D1643453		CO_2 TO LN_2 CHMB CONVERSION ASSY		1643453-002	80
00	REF	D2639169		CO_2 & LN_2 DUAL CONVERVERS			80
~~00~~	~~REF~~	~~C1640222~~		~~LNE INSTAL ASSY VALCOR VALVE (IN FIELD)~~		~~1640222-009~~	
01	1	D2636322		PARTITION ASSEMBLY		2636322	11
02	1	D2636323		PANEL, REAR		2636323	11
03	1	D1636324		PANEL, FRONT		1636324	11
04	1	D1636325		PANEL, TOP		1636325	11
05	1	D2636326		PANEL ASSEMBLY, BOTTOM		2636326	11
06	1	D1636327		PANEL, LEFT		1636327	11
07	1	D2636328		PANEL ASSEMBLY, RIGHT		2636328	11
08	1	D2636331		BEZEL ASSEMBLY		2636331	11
09	1	D2636341		INNERLINER ASSEMBLY		2636341	11
~~10~~	~~1~~	~~A1634770~~		~~PANEL, TUBE RETAINER~~		~~1634770~~	~~21~~
~~11~~	~~1~~	~~A1634772~~		~~GASKET, TUBE~~		~~1634772~~	~~11~~
12	1	A1602967		OUTER PLATE, VENT		1500553	70
13	1	A1602968		GASKET, VENT		2400063	70
14	1	B1640309		WELD ASSY - TUBE GUIDE		1640309-001	
15	AR			GASKET, STRIPS, 1/16 THK		2400019	90
16	2	C1635605		LATCH, KEEPER		1100051	70
17	1	B2619064		LN_2 INJECTOR ASSY		2619064-002	11
18	A/R	B1600091	③	SHIM, KEEPER		1600091	21
19	1	B1636330		BLOCK, SUPPORT		1636330	11

CONTINUED ON SHEET 4 (REVLIR K ZON)

REVISIONS				
REV	DATE	BY	APPD	DESCRIPTION
G		R Brooks	[illegible]	PER ECN M547
H	6-10-74	E. OLEJNIK	[illegible]	PER ECN M717
J	6-19-74	OLEJNIK	[illegible]	PER ECN M730
C		OLEJNIK		ADDED DASH NOS TO ITEMS 43 & 44 ALL ED ITEM 79 ECN M213
D		KNAPP	[illegible]	PER ECN M239
E		OLEJNIK		PER ECN M403
E		KNAPP		ECN M429

TITLE	NEXT ASSY P/L
CHAMBER ASSEMBLY 6400	END ITEM

BY	D. HAWN	8/1/72
CHK	[illegible]	11-28-72
APPD	L. ELLIS	11-28-72

P/L 2636342 REV P SH 1 OF 5

DELTA DESIGN, INC. | Parts List No. 2636342 REV N | Sheet 2 of 5

Item	Qty	Drawing Number	Description	Manufacturer and Part No.	Stock No.	Fab. Code
20	2	B1600004	COVER BLOWER		1600004	21
21	8		SPACER, 1/2" LONG		4100093	70
22	4		FOOT		1500419	70
23	A/R		INSULATION, FIBERGLASS		2400025	90
24	A/R		INSULATION, PRESSTITE		2400026	90
25	1		PLUG (1-1/4" DIA HOLE)		1700142	70
26	1		PLUG (1/2" DIA HOLE)		3600081	70
27	1		THERMOMETER, 8"		2300011	70
28	1	B1600136	CUP, THERMOMETER		1600136	21
29	1	A1600076	BUSHING, THERMOMETER		1600076	21
30	1	B2602503	THERMOSWITCH ASSY S1		2300004	70
31	1		LAMP, NEON DS1		1400082	70
32	2	D2621006	MOTOR, BLOWER B1, B2		2621006	70
33	~~1~~	~~A1636422~~	~~LABEL, ACCESSORY OUTLET~~		~~1636422~~	~~32~~
34	1		RELAY K1		1400218	70
35	1		CAPACITOR .05uF, 400V, C1		0700520-400	70
36	2	B2622524	HEATER ASSY, 8.75 Ω HR1, HR2		2622524-001	21
37	1	B2618018	CO_2 ASSEMBLY		2618018-003	16
38	1		TERMINAL BLOCK TB1		1400572	70
39	1	~~B2635055~~	~~PANEL ASSY, SIGNAL A3~~		~~2635055~~	~~26~~
40	~~1~~	~~C2635059~~ A2	~~PANEL ASSY, POWER~~ 208 V ~~A2~~		~~2635059~~	~~26~~
41	1		PROBE R1		2300031	70
42	~~1~~		~~OUTLET, CONVENIENCE J1~~		~~1500083~~	~~70~~
43	1	A2635264-002	CABLE ASSY W1		2635264-002	27
44	1	A2635265-001	CABLE ASSY W2		2635265-001	27
45	1	A2636426	CABLE ASSY 208 V W3		2636426	27
46	~~2~~		~~FUSE 15A~~		~~1400037~~	~~70~~
47	2	A1635610	SPACER		1635610	11
48	1		GROMMET, 1/2"		1500032	90
49	6		CABLE TIE		1500013	90
50	6		PUSHMOUNT		1500014	90
51	1	B1640100	FLEXIDRIVE		1640100	70
52	1	B1636329	EXTENSION, FLEXIDRIVE		1636329	11
53	1		COUPLING, FLEXIDRIVE		1500450	90
54			#6 RUBBER STOPPER		1500255	90

DELTA DESIGN, INC.	Parts List No. 2636342	REV N	Sheet 3 of 5

Item	Qty	Drawing Number	Description	Manufacturer and Part No.	Stock No.	Fab. Code
55	4		SCREW, #4 x 1/2 PHPSM		6904122-400	90
56	2		SCREW, #4 x 1/2 FHPSM		6904122-100	90
57	2		SCREW, #4-40 x 5/8 PHPM		6804405-824	90
58	1		SCREW, #4-40 x 1/4 PHPM		6804401-408	90
59	45		SCREW, #6 x 1/2 PHPSM		6906122-400	90
60	20	(21 REQD 208V ONLY)	SCREW, #6-32 x 1/2 PHPM		6806321-224	90
61	20		SCREW, #6 x 82° x 1/2 OHPSM		6906122-200	
62	2		GROMMET		1500026	
63	1	B1643369	GASKET, TUBE		1643369	
64	16		SCREW, #8 x 82° x 1/2 OHPSM		6908122-200	90
65	4		SCREW, #8-32 x 82° x 1/2 OHPM		6808321-222	90
66						
67	4		SCREW, #10-32 x 5/8 PHPM			90
68	4		SCREW, #10-32 x 3/4 ALLEN CAP		6810325-824	90
69	1				6810323-428	
70	11	(12 REQD 208V ONLY)	WASHER, #6 LOCK		6606011	90
71	4		WASHER, #10 FLAT		6601000-	90
72	4		WASHER, #10 LOCK		6601011	90
73	1		NUT		1500735	70
74						
75	8		SOLDERLESS TERMINAL RING		1500062	90
76	1		SOLDERLESS TERMINAL, SPADE		1500055	90
77	6		WIRE NUT, SMALL		1500028	90
78	2		SOLDERLESS TERMINAL, RECEPTACLE		1500047	90
79	1	A2635607-002	CABLE ASSY. 240V		2635607-002	17
80	1	A2635833-003	CABLE ASSY. 125V		2635833-003	17
81	A/R		WIRE, TEFLON 18 AWG		1500387	90
82	~~A/R~~		~~WIRE, TEFLON 14 AWG~~		~~1500380~~	~~90~~
83	~~1~~	~~E2635058~~	~~POWER PANEL 125V~~		~~2635058~~	
84	1	~~E2635053~~ /2	~~POWER PANEL 240V~~		~~2635053~~	
00	REF	D1640085 /2	OPTION, CO_2 TO LN_2 FAILSAFE ASSY		1640085-001	
00	REF	D1640085 /2	OPTION, CO_2/LN_2 FAILSAFE DUAL ASSY		1640085-002	

FORM 4-17-72

DELTA DESIGN INC.
5725 KEARNY VILLA RD
SAN DIEGO, CA 92123
TEL (714) 292-5000

NOTES:

⑥ QTY 2 REQD FOR 120V BASIC CHAMBER ASSY & 240V CONVERSION
QTY 3 REQD FOR 208V CONVERSION

ITEM	QTY	REF DESIG OR VENDOR NUMBER	DESCRIPTION	MANUFACT AND NO	STK OR PART NO.	FAB CODE
86	2		WASHER #10 LOCK		6610010-000	
87	1		#10-32X3/4 PHP MS		6810323-404	
88	4		#10 FLAT WASHER		6710320-000	
89	2		#10-32 HEX NUT		6710320-000	
90	4		SCREW #6X1/2 PHPSM		6906126-400	
91	1	⑤ 2618020	SHIP KIT		2618020-001	
92	1	EIK-332R	GUIDE TUBE VENT		1642363	
93	4		SCREW #6-32X3/8 PHP H-C ST-NP		6806323-804	
94	6		NUT #6-32 ST. NP		6706322-000	
95	1		SOCKET J1		2000044	70
96	1		TERMINAL BLOCK TB2		1400509	
97	1	②	CIRCUIT BREAKER CB1 208V	AM3-A3-A-20-3	1400001	
98	4	(6 REQD FOR 208V)	6-32 X 1/4 PHPMS			
99	⑥	A2635048	CAPACITOR C2, C3 (C4=208V ONLY)		2635048	
100	1	②	STRAIN RELIEF 208V		1500079	
101	8.5FT	②	POWER CORD 208V		1500465	
102	1	②	PLUG, POWER 208V		2000132	
103	4	(6REQD FOR 208V)	SOLDERLESS TERMINAL (RING		1500071	
104	1		PLUG, POWER 120V		2000135	
105	1		SOLDERLESS TERMINAL (RING)		1500056	
106	A/R		WIRE, 12 AWG		1500376	
107	A/R		WIRE, 12 AWG HIGH TEMP	12958/JB53LG5-1	1501464	
108	1	②	PLUG, POWER 240V		2000224	
109	2		SCREW, 6-32 X 3/4 PHPMS			
110	1	A1600012	NULL TERMINAL COVER		1600012	
	1		PLUG, P1		2600409	

REVISIONS				
REV	DATE	BY	APPD	DESCRIPTION
K	8-9-74	P.H. GORDON	R Brack	PER ECN M800
L	10-9-74	A.H. [illegible]	R [illegible]	PER ECN M823
M	9-16-75	R Brack	R Brack	PER ECN M1025
N	1-28-76	L. DUNLEVY	R Brack	PER ECN M1049
P	8-22-77	RANGE	[signature]	PER ECN M1233

TITLE: SEE SHT 1

NEXT ASSY P/L

BY P.H. GORDON 8-9-74
CHK
APPD

P/L 2636342 4 5

DELTA DESIGN, INC. | Parts List No. 2696342 REV N | Sheet 5 of 5

Item	Qty.	Drawing Number	Description	Manufacturer and Part No.	Stock No	Fab. Code
111	1	(2)	CIRCUIT BREAKER CB1 240V	AM2-A3-A-15-2	1400022	
112	8.5FT		CORD, POWER 240V, 120V		1500394	
113	2		STRAIN RELIEF 240V, 120V		1500077	
114	2		SCREW 4-1/4 PHFSM			
115	1	B1643476	IDENT. PLATE		1643476	
116	1		CIRCUIT BREAKER CB1 120V		1400008	
117	1		TRANSFORMER T-1 240 V		1636487	

www.manualsplus.com
1008496